Alireza Habibzadeh

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Education

Sharif University of Technology — Tehran, Iran
B.Sc. in Computer Engineering, GPA: 18.62/20 — 2020–2025 (expected)
B.Sc. in Physics (double major), GPA: 19.06/20

Young Scholars Club — Tehran, Iran
Preparation Course for the International Physics Olympiad — 2019–2020

Allame Helli High school — Tehran, Iran
Diploma in Mathematics and Physics, GPA: 19.66/20 — 2017–2020

Experience

Laboratory of Photonics and Quantum Measurements (LPQM) — Lausanne, Switzerland
Research intern under supervision of Prof. Tobias J. Kippenberg at École polytechnique fédérale de Lausanne (EPFL). — Summer 2023

Worked on developing an automatic qubit calibration system as well as other projects. (See projects section)

Mobile Communication Company of Iran (MCI) — Tehran, Iran
MCI's Hamrah Academy Internship Program for Olympiad-winning and top undergraduate students. — November 2022–June 2023

Teaching Experience

- **Linear Algebra** (TA) — Spring 2023
  Prof. Samira Hossein Ghorban, Sharif University of Technology
- **Engineering Probability and Statistics** (TA) — Fall 2022
  Prof. Ali Sharifi-Zarchi, Sharif University of Technology
- **Intro Programming** (TA) — Fall 2022
  Prof. MohammadAmin Fazli, Sharif University of Technology
- **Physics Olympiad** (Teacher) — 2019–2022
  Allame Helli High school

Honors and Awards

- Selected as one of 41 students worldwide ($< 3\%$ acceptance rate) to participate in the **E3 (EPFL Excellence in Engineering)** internship program [Certificate] — 2020
- **Silver medalist** at 4^{th} European Physics Olympiad, Romania [Certificate] — 2023
- **Sir Isaac Newton Award** (Among the top 200 participants) [Certificate] — 2020
  Sir Isaac Newton Exam (SIN) is a test of high school physics and is offered by the Department of Physics & Astronomy at the University of Waterloo.
- **Gold medalist** at 31^{st} Iranian Physics Olympiad [Certificate] — 2019

Notable Courses and Workshops

- Machine Learning — Fall 2023
  Sharif University of Technology
- Quantum Mechanics II — Fall 2023
  Sharif University of Technology
- Network Science — Fall 2023
  Sharif University of Technology
- Integrated Photonics for Next Generation Technologies (INGEN2023) — July 2023
  Saanen, Switzerland
- Introduction to Quantum Technologies [Certificate] — March 2023
  Psiket School of Science and Technology, Tehran, Iran
- Qubit by Qubit [Certificate] — September 2022–April 2023
  IBM Quantum
- Artificial Intelligence — Spring 2023
  Sharif University of Technology
- Complex Systems — Spring 2023
  Sharif University of Technology
- Data Transmission — Fall 2022
  Sharif University of Technology
- Key Concepts in Blockchain Technology [Certificate] — Fall 2022
  IEEE Iran section
- Signals and Systems — Fall 2021
  Sharif University of Technology
- Advanced Programming — Spring 2021
  Sharif University of Technology
- Hands on Particle Physics [Certificate] — March 2018
  The International Particle Physics Outreach Group (IPPOG)

Projects

- LPQM Automatic Qubit Calibrator — Summer 2023

  We developed an automatic calibrator system utilizing Quantum Machines® controllers (OPX+ and Octave). Eight calibration nodes employ diverse spectroscopy techniques to make measurements and analyze reflection data (S_{11}) from superconducting qubits. We have implemented a database and API for seamless communication among these nodes. By automating the calibration process, formerly done manually with Vector Network Analyzers (VNAs), we not only streamline measurements but also provide researchers with valuable insights into temporal shifts through continuous monitoring of resonator frequencies, Qubit frequencies, T_1, and more.

- LPQM Switch Controller [Repository] [Demo] (Not connected to the real fridge!) — Summer 2023

  Developed a Python API and GUI for a network switch connected to Radiall™ switches in the Bluefors fridge at LPQM lab, optimizing switching processes to minimize pulse length and reduce heat input during setup changes.

- LPQM Autonomous Wafer Testing System — Summer 2023

  The project configured an MPI 2000 prober and a Keithley parameter analyzer for remote control. Diagnostic assessments revealed a hardware issue with the prober's GPIB module. We resolved this by connecting an external GPIB module and adjusting software settings, enabling successful communication and automating the wafer test procedure.

- Percolation Models in Disease Dynamics (Related course: Complex Systems) [Repository] Spring 2023

  We analyzed disease spread using percolation models, comparing outcomes with traditional SIR simulations on weighted graphs. Our project offers key insights into real-world epidemics, emphasizing the significance of percolation models for a nuanced understanding of disease propagation.

- Virial Theorem in Three-Body Gravitational Systems (Related course: Analytical Mechanics II) Spring 2023

  Our project explores the three-body gravitational problem. Despite limited analytical knowledge, we simulated the system in various scenarios and confirmed the enduring validity of the Virial theorem over time. This sheds light on the stability of three-body gravitational systems and the resilience of fundamental celestial principles.

- Java Yu-Gi-Oh! (Related course: Advanced Programming) [Repository] Spring 2021

  We made a graphical Java version of the iconic card game, showcasing programming prowess and game design.

Computer Skills

- **Tools and Frameworks:** Numpy, Scipy, Qiskit, IBM Quantum Lab, Git, LaTeX
- **Programming Languages:** Python, R, Matlab, C/C++, Java, Verilog

Languages

- **Persian:** Native
- **English:** Fluent
  C2 level of proficiency [Iran Language Institute certificate]

Extracurricular Activities

- Programming hobby
  I enjoy crafting scripts and code to simplify and enhance daily tasks. My GitHub account serves as a showcase for the diverse range of projects I undertake.
- Photography
  I love capturing moments with both my DSLR camera and mobile phone.
- Cinema Helli film-making group 2017
  I co-founded a filmmaking group. We won the best student performance award in the school's seminar.
- LAF student journal editor-in-chief 2016
  I gathered a group of ten to write and publish a student journal roughly every month.
- Student Blog 2015
  I started a student weblog (1-3helli1.blog.ir) and gathered a team of five. The blog ranked among the top 10 blogs of the year in the country. [Ranking]

References

Prof. Tobias J. Kippenberg
Full Professor
Laboratory of Photonic Integrated Circuits and Quantum Measurements
École Polytechnique Fédérale de Lausanne (EPFL)
Email: tobias.kippenberg@epfl.ch

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Institute for Research in Fundamental Sciences (IPM)
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